SECTION 230923.14 FLOW INSTRUMENTS

Data contained in this guide specification may be placed in either of the following sections, depending on the specifics of the system design, or incorporated within the next higher level controls specifications (230923.14 FLOW INSTRUMENTS or even higher in 230923 DIRECT DIGITAL CONTROL (DDC) SYSTEMS FOR HVAC).

PART 2 PRODUCTS

2.1 PRODUCTS INCLUDED IN THIS SECTION

A. Bi-Directional Bleed Airflow and Temperature Sensor with integral Rack-Mount Housing

2.2 ACCEPTABLE MANUFACTURERS

A. EBTRON, Inc. model SERVAIRE-E100 Basis of Design
   1. Airflow measurement devices shall use the principle of thermal dispersion and provide one self-heated bead-in-glass thermistor and one zero power bead-in-glass thermistor at each sensing node.
      a) Thermal dispersion devices that indirectly heat a thermistor are not acceptable.
   2. Substitution requests for acceptance less than 60 days prior to bid date or products submitted in non-conformance with the physical capabilities and functional aspects or performance requirements of this specification, will not be considered.
      a) For any product to be considered for substitution, a written document shall be submitted to the engineer detailing exceptions and compliance, section-by-section with supporting documentation, before an approval will be considered.
      b) Any product submitted as an equal shall be expected to comply with all performance capabilities and functional aspects of this specification.
   3. Excluded devices:
      a) Measurement technologies using “chip-in-glass”, “chip-in-epoxy” or other “chip” type thermistors for the heated sensor component are not acceptable.
      b) Pitot tubes, Pitot arrays, Piezo rings and other pressure based devices are not acceptable.

B. Products approved
   1. [List approved equals here that comply with ALL requirements of this specification section]

2.3 BIDIRECTIONAL AIRFLOW and TEMPERATURE SENSORS in a SINGLE RACK-MOUNT HOUSING

A. Provide compliant combination bleed airflow/temperature sensors where indicated on the plans.

B. Each measuring device shall consist of one each standard 1U rack height enclosure per sensor assembly 1.75 H x 19 W x 12 D in. (44.5 x 482.6 x 304.8 mm) with an integrated microprocessor-based transmitter.
   1. Each sensor assembly shall contain three individually wired, hermetically sealed bead-in-glass thermistors contained in a glass-filled polypropylene sensor housing.
      a. Devices using less than three thermistors in each sensor assembly are not acceptable.
   2. Thermistors shall be potted in the sensor assembly using a marine-grade, waterproof epoxy.
   3. Thermistor leads shall be protected and not directly exposed to water or the environment.
   4. Each transmitter shall be capable of providing bi-directional airflow or the calculated equivalent differential pressure data to the BAS, indicate system status locally or remote, and contain internal diagnostics routines.
   5. Pressure-based sensors are not acceptable.

C. Sensor Assembly Construction and Performance
   1. Each sensor assembly shall be manufactured of a U.L. Listed engineered thermoplastic, glass-filled polypropylene.
   2. Each measuring device shall be calibrated at a minimum of 9 airflow rates to NIST traceable airflow standards.

a) Submissions for AMD approval shall include a copy of the actual NIST report of calibration for the reference standard used.
    1) Devices claiming NIST traceability to third party laboratories and not directly to NIST are not acceptable
    2) Devices calibrated against standards other than the NIST LDA or against NIST temperature standards only, are not acceptable.
    3) Devices with sensors calibrated against NIST temperature standards only are not acceptable.

3. Each thermistor shall be individually calibrated at a minimum of 3 temperatures to NIST-traceable temperature standards.
4. Each measuring device shall have an accuracy of ±2% of reading (velocity) over the entire calibrated airflow range, including transmitter uncertainty, with a repeatability of ±0.25% of reading.
5. The calibrated airflow range shall be +2,000 FPM to -2,000 FPM (+ to -10.16 M/s). This equals approximately -0.5 to +0.5 in. H_2O.
6. Temperature accuracy shall be ±0.15°F (0.08°C) over the entire system operating temperature range of -20°F to 160°F (-28.9°C to 71.1°C).
7. The operating humidity range for each sensor system shall be 5-95% RH (non-condensing). Product design shall consider direct exposure to or immersion in liquid water and temporary exposure shall not damage the sensing elements.

D. Transmitters
1. The transmitter shall be mounted internally to the rack enclosure.
2. All integrated circuitry shall be temperature rated as 'industrial-grade'. Submissions containing 'commercial-grade' integrated circuitry are not acceptable.
3. The transmitter shall have an integral, minimum 16-character LCD display capable of simultaneously displaying airflow and temperature.
4. The transmitter shall be capable of field configuration, diagnostics and include an on-board 4-button interface and the LCD display.
5. The transmitter shall have an on-off power switch. Isolation transformers shall not be required.
    a) The transmitter shall use a 110 VAC@ 8V-A power, and be fused and protected from over voltage, over current and power surges.
    b) The transmitter shall use "watch-dog" circuitry to assure automatic reset after power disruption, transients and brown-outs.
    c) Power supply shall include dual independent redundant power supplies.
6. The transmitter shall be capable of communicating with other devices using the following network interface:
    a) One isolated Ethernet network connection (simultaneously supporting field selectable BACnet Ethernet or BACnet IP, Modbus TCP and TCP/IP protocols).
    b) The transmitter shall provide a low and/or high set point alarm, with tolerance delay and reset method, all user defined at set up.
    c) The transmitter shall also provide a system status alarm with both visual and network indication.